Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of

Facilitating Opportunities for Flexible,	)	
Efficient, and Reliable Spectrum	)	ET Docket No. 03-108
Use Employing Cognitive Radio Technologies	)	

REPLY TO OPPOSITION

OF

PETITION FOR RECONSIDERATION

OF

MARCUS SPECTRUM SOLUTIONS

I. SUMMARY

The Opposition (*Opposition*) filed by Information Technology Industry Council (ITI) repeats their statements in the comment phase of this proceeding that they oppose all new regulation of personal computer technology as a general matter. *Opposition* fails to respond to *any* of the specifics of the Marcus Spectrum Solutions (MSS) Petition (*Petition*) to Reconsideration. In particular, *Petition* offers a very narrowly drawn approach to regulating digital-to-analog converters (DACs) that would protect Commission licensees from a possible collapse of the Commission's marketing rules with marketing of high speed, high power DACs that blurt the line between transmitters and digital devices while avoiding *any* impact on any currently sold models and future models made for legitimate applications. The Commission should start a dialog with the computer industry represented by ITI to determine whether the MSS proposal will have minimal long term impact or how it might be modified in view of pending products.

Waiting until problems occur might be traditional, but in this case risks creating a "Pandora's box" situation.

II. BACKGROUND

On March 10, 2005, the Commission adopted a Report and Order in this proceeding[1]. MSS filed a timely petition for reconsideration on June 1, 2005[2]. Another petition was filed by Cisco Systems on June 3, 2005 dealing with different issues.[3] (MSS agrees with and supports the Cisco petition but will not address those issues in this document.) On July 29, 2005 ITI filed an opposition to the *Petition* which is the subject of this response. ITI addressed one of the three issues in the *Petition*: possible new rules for the marketing of DACs. ITI did not address the other two issues in the petition dealing with the need to file source code with the Commission upon request and amateur radio software defined radio transmitters. As of the filing date of this document, there is nothing additional in the record on these two issues.

The *Petition* proposed the Commission treat as Class A digital devices[4] an DAC which has *all* of the following characteristics:

1) have sample speeds in excess of 1 million samples/sec[5] *and*
2) have output power greater than 1 Watt *and*
3) have an interface for receiving the digital input to the D/A converter which is interoperable with widely available Class B personal computer systems (*e.g.* USB and Firewire) *and*
4) have an analog output for the converted signal which is compatible in both connector type and approximate impedance with widely available antennas (*e.g.* BNC)[6]

The *Petition* predicted the following possible outcomes if the Commission let unrestricted sales of any possible type of DACs continue:

> MSS predicts that if high power, high speed D/A converters with antenna-like connectors are ever readily available to the general public through large retailers, *e.g.* Radio Shack, CompUSA, or Walmart, then the whole FCC equipment authorization program will be bypassed and third party providers will have an immediate market for

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[1] Although not traditional, links to documents on FCC website will be used rather than legal citation in cases where these is no ambiguity. This approach expedites looking up of the citations.
http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6517509341

[2] http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6517623374

[3] http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6517625097

[4] A Class A digital device may not be marketed to the general public but may be marketed to businesses. *See* 47 CFR 15.3(s)

[5] The maximum frequency fundamental a D/A converter can generate is half the sampling rate. This proposed sampling rate can generate fundamentals frequencies of 0.5 MHz, or 500 kHz, capable of sending signals in the AM broadcast band.

[6] *Petition* at p. 8

> software that will make computers with such converters into any type of illegal equipment you wish in any band you wish.
>
> MSS predicts that Napster-like entities will market illicit, but not illegal under present FCC rules, software to individuals with PCs and such D/A converters to allow such individuals with no technical skills to emulate all sorts of illegal equipment presently kept off the market by present FCC rules.[7]

III. DISCUSSION

Since the *Opposition* is a short document, MSS will quote most of it in responding to its points.

> In its Order, the Commission ruled with industry that additional regulations specifically for DACs were not necessary. This decision is supported by the public record that shows that, while SDR rules have been in place for several years, there has been no reported widespread misuse of these cards. In its Petition, MSS fails to provide proof to the contrary. Rather, MSS suggests an impending, hypothetical problem, stating that there will be a massive move by industry and consumers to develop software which will allow DACs to be used in illicit or illegal radios that operate on any and all bands, including those that are restricted. Again, even from before the time SDR certification was permitted, FCC records show little evidence that would support the likelihood of cards being converted into unauthorized radios.

MSS agrees that there has been no "misuse" of DACs in the past several years reported in the public record. But the reason for this is simple: there are presently no high speed, high power DACs available to the general public at reasonable prices. Certainly ITI, of all organizations, should be familiar with Moore's Law[8] and the dynamic increase of digital device speeds and price decreases over the past decades. So while high speed DACs[9] are in the $1000+ range now, they might drop to consumer range with a few years. Electronics to make a high speed, lower power DAC into a high speed, high power DAC is traditional analog electronics and is already modest in price.

ITI alleges that MSS is concerned about "a massive move by industry and consumers to develop software which will allow DACs to be used in illicit or illegal radios that operate on any and all bands". First, MSS does not believe that ITI's members or any other mainstream manufacturer intends to subvert the intent of the Commission's Rules through marketing DACs intended for use as radio transmitters. The point is that that the bight line dividing transmitters from consumer digital devices at present would be hopelessly blurred by the marketing of devices that meet *all 4* of the criteria in the *Petition*.

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[7] *Petition* at p. 6

[8] *See* http://en.wikipedia.org/wiki/Moore%27s_law

[9] *See Petition* at fn. 7

A "massive" effort would not be required to convert a high speed, high power DAC into a transmitter. A simple Google search already found the documents[10] which are included as attachments to this filing. In these two cases, hobbyists have figured out how to use existing videocards, close cousins of DACs, as short range transmitters in the AM and TV broadcasting bands. The limited power and other design features of today's videocards prevent them from being a significant interference threat and they would not come under the definition proposed in the *Petition*. But with the retail availability of DACs meeting the characteristics in the *Petition* other hobbyists could also public detailed descriptions as the authors of the two attachments have. As ITI should be aware, "hackers" are a pervasive phenomenon today and creative nonprofessionals often find ways to use hardware and software for applications not intended by their developers.

Finally, while ITI and its members are well intentioned, the FCC Rules apply to <u>all</u> manufacturers and marketers of equipment. Fn. 51 of the *Report and Order* deals with the *Pilot Travel Centers* case. This should remind the Commission that there are commercial enterprises which do not have as benign a worldview as the ITI membership. The record shows that Pilot Travel Centers was searching for loopholes in the Rules that would permit it to market equipment for antisocial uses. Similar firms will leap at the opportunity to sell "transmitters" using high speed, high power DACs should they become available to the general public at low cost through mass marketing. Already, the Commission has been fighting a multiyear problem to suppress the sale of cordless telephones which achieve long range because they operate in aviation bands. Unrestricted sale of high speed, high power DACs will give a new market path to this "product".

Opposition goes on to state,

> The adoption of SDR has neither changed nor waived the requirement that intentional radiators must be certified in accordance with the applicable regulations and technical rules under Title 47 of the Code of Federal Regulations. Therefore, all such devices operating as radios, whether modified via hardware or software, are still required to be certified for operation in the designated band. ITI believes that enforcement of these existing regulations will adequately prevent DAC-modified radio devices such as those described by MSS from being readily available to the public.

MSS agrees literally with the first sentence – requirements have not changed. However, opportunities will change as a result of anticipated new DACs. Someone with little technical skill will be able to plug a DAC into their PC as easily as a new videocard or USM memory and then download software such as that described in the two attachments. And, *voila*, you have a transmitter. No equipment authorization required! You just market the DAC and the software separately.

[10] http://fabrice.bellard.free.fr/dvbt/ and http://www.erikyyy.de/tempest/

IV. CONCLUSIONS

MSS sympathizes with ITI and their wish for no additional regulation. The Commission may recall that the author of this document stressed deregulation during his career at the Commission and was the initiator and main author of the Report and Order in Docket 83-114 which proposed and adopted a narrow framework for technical regulations at FCC. The *Petition* did not seek regulation for the sake of regulation, rather it proposed a very tightly defined definition of DACs that would be subject to Class A restrictions. All other DACs, including all devices presently marketed to the general public would continue to have the minimal regulation that applied to Class B digital devices such as normal PC equipment.

MSS offers to meet and interact with ITI, the Commission staff, and all others to review possible definitions of DACs subject to additional regulation in order to develop a draft rule that would both protect spectrum users and have minimal impact on legitimate digital device manufacturers and vendors. MSS urges the Commission to encourage and facilitate such a dialogue.

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